

**United States
Environmental Protection Agency
Office of Transportation and Air Quality
National Vehicle and Fuel Emissions Laboratory
2565 Plymouth Road
Ann Arbor, MI 48105**

Canister Preconditioning Procedure

This procedure is written for the Environmental Protection Agency, National Vehicle and Fuel Emissions Laboratory (NVFEL) internal use. The use of specific brand names by NVFEL in this procedure are for reference only and are not an endorsement of those products. This document may be used for guidance by other laboratories.

NVFEL Reference Number

720C

Implementation Approval

Original Procedure Authorized by EPCN #188 on 10-16-95

Revision Description

08-05-98 The purpose of this change is to revise the procedure as described in EPCN 230.
06-15-04 The purpose of this change is to revise the procedure as described in EPCN 356.

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1. Purpose

The purpose of this procedure is to precondition the vehicle canister for the supplemental two-diurnal or three-diurnal evaporative and exhaust emission test sequence.

The two-diurnal sequence preconditioning incorporates an auxiliary canister connected to the vehicle canister to collect excess butane vapor once the vehicle canister is loaded to breakthrough.

2. Test Article Description

1996 and later model year light-duty vehicles.

3. References

3.1 "Code of Federal Regulations," Title 40, Part 86, Sections 130, 132, 133, and 138

3.2 "Mail-out #95," State of California, Air Resources Board, Notice of Public Availability of Modified Text

3.3 Sierra Instruments 830/840/860 Mass Flow Meters & Controllers Instruction Manual

3.4 Sartorius Laboratory "PMA-7500 S-X Operating Instruction Manual"

3.5 Test Procedures: NVFEL 703, NVFEL 707, and NVFEL 710

Note: All references to the Test Procedures include those referenced and all subsequent revisions thereof.

3.6 Environmental Protection Agency (EPA) current safety policies

3.7 Bebeco Industries Enclosure Protection System Model 1002, Type "2" Rapid Exchange Purge System, Installation, Operation, and Maintenance Manual

4. Required Equipment

See Attachment A for a diagram of the canister preconditioning system.

4.1 Auxiliary Canister

Equipment used: Chrysler Part # 4241837

4.2 Computer Data Acquisition and Control System:

4.2.1 Microcomputer

Equipment used: Intel Pentium 4 2.53 GHz, AT/AT compatible PC, 512 M RAM

4.2.2 Video Monitor

Equipment used: Samsung SyncMaster 1911T

4.2.3 Data Acquisition Devices

4.2.4 Mass Storage Device

Equipment used: MAXTOR ATLAS 10K4 Capacity: 68.4 GB

4.2.5 Printers

Equipment used: Hewlett Packard LaserJet 4 Plus

4.2.6 File Server Software

4.2.7 Operating System

Equipment used: Windows 2000 Professional

4.2.8 Data Acquisition & Control Software

Equipment used: MTS VX-In with Richmond Instruments & Systems Inc. (RISI)-developed CPS software

4.2.9 Computer Data Acquisition and Control System Cabinet

Equipment used: Hoffman APX-PC Enclosure, with two window doors, keyboard compartment, pull out shelves, and cooling fan
P/N: X-PCA1688

- 4.2.10 Data Acquisition and Control Electronics Assembly fabricated by EPA, consisting of the following component parts:

Equipment used: Hoffman Pull Out Shelf: P/N: D-L29SHP

Astro Dyne ± 15 Volts Direct Current (VDC) MFC Power Supply, Model # LND-Y-152

Lambda Electronics ± 24 VDC Solenoid Power Supply, Model # EWS100-24

Lambda ± 5 VDC Relay Board Logic, Model # EWS15-5

Flat cable to discrete wire Module: 50 conductor, for National Instrument Boards:

Phoenix Contact P/N: 22 81 08 9, Type: FLKM50

Flat cable to discrete wire Module: 20 conductor, for MFC Cables:

Phoenix Contact P/N: 22 80 01 9, Type: FLK20

Fused Surge Suppressing Terminal Block for MFC signals

Phoenix Contact P/N: 70 05 89 7,

Type: Special of DOKD 1, 5 TG

Terminal block, 4 conductor, to distribute ± 15 VDC to MFCs: Phoenix Contact P/N: 27 18 20 6,

Type: VIOK 1,5-3D/PE

Terminal Block Integrated Diode for Solenoid Valve circuits: Phoenix Contact P/N: 27 91 01 6,

Type: UKK5-DIO/O-U

Terminal Block Double Level with Ground Foot for Solenoid Valve circuits and distribute 120VAC power

Phoenix Contact P/N: 04 61 01 8, Type: SLKK5

Octal Relay Base for emergency shutdown relay.

Phoenix Contact P/N: 70 01 21 3, Type: RMOB JR-2

Relay for power supply emergency shutdown.

Potter and Brumfield P/N: KRP-14AG-120

Relay Board, OPTO-22, Model # G4P38

Relays, OPTO-22, Model # G40DC5MA

Terminal Board Enclosure

Hoffman NEMA 12,13 Model # C-SD16128

Cabinet Cooling Fans - Hoffman Muffin 6"

4.3 Test Ambient Monitoring System:

Equipment used: Vaisala Humidity & Temperature Transmitter
Type: HMP 233 B2CIAZEE23AZA

Digital Barometer
Bell and Howell Digital Barometer

4.4 Combustible Gas Detector System (CGDS)

Equipment used: Drager Polyton IR EX with Drager Quad Guard Interface

4.5 Electronic Scale

Equipment used: Sartorius PMA-7500 S-X

4.6 Scale Enclosure

Equipment used: Hoffman Special Enclosure Type 4.12 (C-SD201610W)

4.7 Uninterruptible power supply

4.8 Dehumidifier

Equipment used: Sears Dehumidifier, Model # 106.95501 modified with tunnel and cooling coil

4.9 Flow Management System:

Equipment used: Butane Mass Flow Controller (MFC)
Sierra, Model # 840D-L-1-V1-ON-SK

Nitrogen MFC
Sierra, Model # 840D-L-1-V1

Purge Air MFC
Sierra, Model # 840D-M-1-V1

Explosion-proof Solenoid Valves
ASCO, Models EF8262G86 & EF8210G87

Explosion-proof NEMA4 Terminal Box
GS O-Z/Gedney, Model # GUB-443A

Flow Component Enclosure
Hoffman, NEMA 12,13, Model # C-SD302412W

Flow Component Enclosure Purging System:
Bebco, Model 1002-WPS Type "2"

Purging System Enclosure Protection Vent:
Bebco Model EPV-2-PG-90

4.10 Liquid Butane

Equipment used: 99% minimum liquid phase, Chemically Pure Grade

4.11 Butane Cylinder Safety Storage Cabinet

Equipment used: AGA Gas Inc.
Model #A7007

4.12 Butane Tank Scale

Equipment used:

4.13 Vacuum Pump

Equipment used:

5. Precautions

5.1 Care must be taken when operating equipment using combustible gases.

5.2 If readings of the CGDS exceed 5% of the lower explosion limit (LEL), leaks in the butane delivery system or other sources of hydrocarbons, such as gasoline vapor, may be present.

If the CGDS reaches a high level alarm of 40% LEL, the CGDS will automatically shut off power to the flow cabinet, which will close all valves. The canister preconditioning program must be shut down immediately.

5.3 The red light next to the hood must not be illuminated. If it is on, it indicates no air flow through the hood.

5.4 The compressed air system must be on.

5.5 Familiarity with the computer of Richmond Instruments & Systems, Inc. (RISI) and the VX-In software is necessary.

5.6 During testing using the two-diurnal loading procedure, if the total flow of butane is greater than two times the manufacturer's canister capacity and the auxiliary canister balance has not gained more than 2.0 grams, the "RISI" Canister Preconditioning System program will stop the flow of butane to the canister and abort the test.

6. Visual Inspection

Visual inspection of the test setup is performed; specific inspections for visual inspection are covered in Section 7, Test Article Preparation.

7. Test Article Preparation

If you are unfamiliar with the MTS VX-In software, you must obtain user training from a VT senior technician formally trained in it.

For canister preconditioning described in 40 CFR 86.130, one of the following methods will be used to precondition multiple evaporative emission canisters during the soak period:

For vehicles with multiple canisters in a series configuration, the canisters must be preconditioned as a unit connected in series. Refer to manufacturer-supplied instructions for connecting canisters.

For vehicles with multiple canisters in a parallel configuration, each canister must be preconditioned separately.

- 7.1 Verify that Form 702-01 was completed after the vehicle preconditioning drive and the vehicle fuel tank has been drained and filled to its 40% tank fuel volume.
- 7.2 Verify that the correct "Vehicle ID" and the "Test Number" are recorded on Form 700-04 , Attachment B (or Form 700-05 for Canister Load Only, Attachment C).
- 7.3 Exercise extreme care when operating equipment with combustible gases.
- 7.4 Verify no alarm conditions exist in the CPS area.
- 7.5 Verify that the ventilation hood is operating properly. The red light on the wall next to the ventilation hood should not be illuminated.
- 7.6 Verify that the Butane supply located in the blue, explosion-proof cabinet located against the West wall, beside the vent hood, is on. Also ensure that it is at the proper setting. To check proper setting consult the CP engineer.
- 7.7 Verify that the RISI Canister Preconditioning System (CPS) Control Units with their monitors are turned on.

There are two Control Units, each one operating two canister load stations. When a unit is turned off, the monitor screen will be dark, and a small, green LED will be blinking at the lower right side under the screen.

7.8 If needed, power up the unit by

1) turning the black "Control Power" button to the "On" position located on the front left side of the unit, and

2) open the lower cabinet door and pull down the black cover of the internal cabinet and press on the black toggle-switch marked "I" [ON] and "O" [OFF] in the lower center of the cabinet. See Figure 1.



Figure1
Lower cabinet Power toggle switch

7.9 On activation, two green LEDs will light below the monitor screen and the computer will begin powering up the system. Once the programs are loaded, the Norton Anti-Virus program will run for about five minutes.

On completion , close out the Anti-Virus box by clicking in the "x" box at the top right corner. If needed, repeat the above steps to power-up the second RISI unit with its own two stations..

- 7.10 Verify that the Sartorius Scale inside the scale enclosure is powered by checking the illumination of the digital readout. If it is not on, activate the on switch marked "I". The digital readout panel will illumine. See Figure 2.

Repeat the process for all of the four Sartorius scales, to ensure they are turned on and ready to use.



Figure 2
Sartorius digital readout panel

- 7.11 At this point make a selection of one of the four canister load stations (CPS1, CPS2, CPS3, and CPS4) and the corresponding scale for use in the procedure.
- 7.12 After selecting a CPS station, connect the test vehicle to the canister preconditioning system using the manufacturer's instructions. Verify that the manufacturer has identified all the ports that are needed for loading, and has included adequate instructions. If not, notify the certification representative.
- 7.13 Inspect the CPS purge and load hoses for cracks or other damage that might cause leaks.
- 7.14 Connect the CPS butane-filler line to the vehicle loading port.
- 7.15 Connect the CPS return hose from the manufacturer's vehicle breakthrough port to the auxiliary canister vent port and place a check mark on Form 700-04 (or Form 700-05 for Canister Load Only).
- 7.16 Record the "Auxiliary Canister ID" on Form 700-04 (or Form 700-05 for Canister Load Only).
- 7.17 Verify that the canister load rate will be 40 ± 2 grams per hour for a two-day diurnal and 15 ± 2 grams per hour for a three-day diurnal test. Place a check mark on Form 700-04 (or Form 700-05 for Canister Load Only). If the test is a three-day diurnal, you must obtain an approval signature from a certification representative.

- 7.18 Sign and date the top portion of Form 700-04 (or the bottom of Form 700-05 for a three-day diurnal test).

8. Test Procedure

100 Test Number Transfer

- 101 From the CPS Test Select Screen, the operator can select the desired test sequence or system operation from the push-button options.

Please refer to the CPS Test Type Description sheet for a detailed description of the different test sequences, if more information is required.

- 102 On either RISI CPS control unit, double-click on the "Start MTS Software" icon to activate the computer program.
- 103 Two prompters will appear. The "Test Builder" display notifies the operator that the test build has successfully been completed. The second display states that "Communication Established".

Click on the "OK" buttons for both. The system is now loading and will take the operator to the main menu.



Figure 3

- 104 Proceed to the West Soak Inter-Face Computer (IFC) station, located alongside the Evap VTSBEDs.

- 105 Double-click on the icon of "Post Process VT SHEDs and CPS" on the monitor of the IFC computer station.



Figure 4

- 106 Click on the "Automatic Post Processing" button. This must be done to save the previous canister load test data.

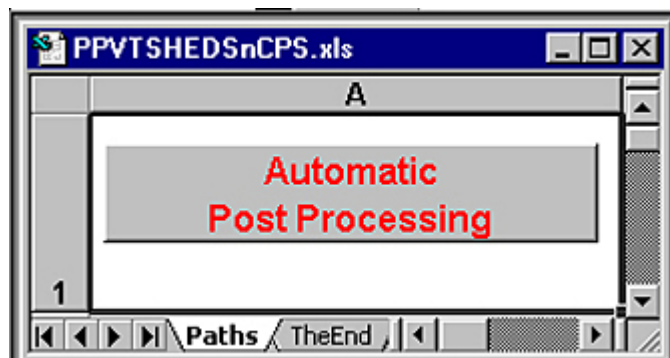


Figure 5

- 107 Enter the number of the canister loading station used to hook up the test vehicle, by clicking on the corresponding white button. See Figure 6. The number of the CPS station has to be the same one used earlier for hooking up the vehicle.

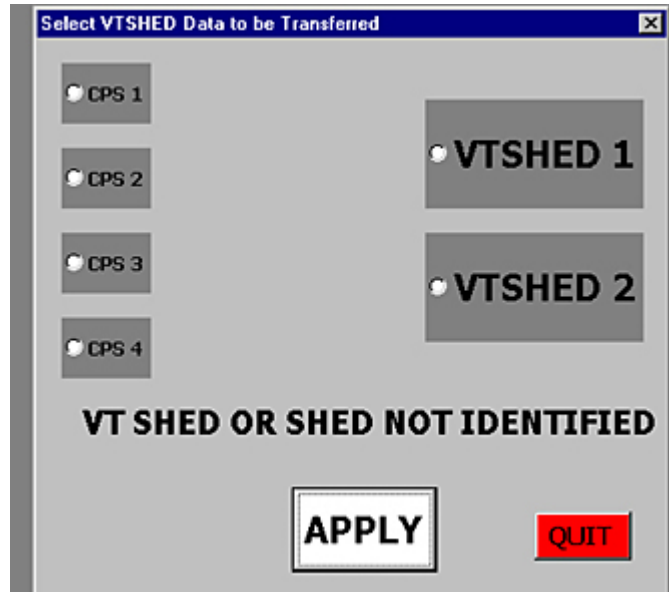


Figure 6

- 108 Click on the "APPLY" button.

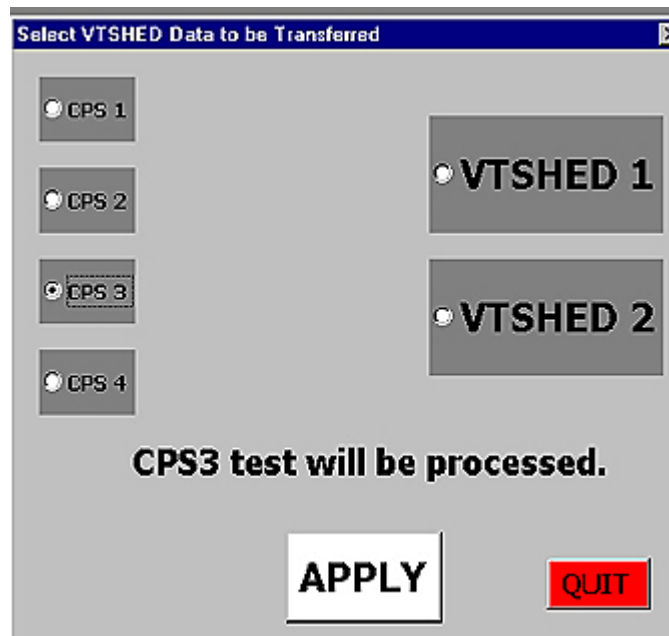


Figure 7

- 109 A dialog box appears for confirmation that the CPS number test should be processed. Click on the "OK" button to confirm the CPS number test should be processed. See figure 8.

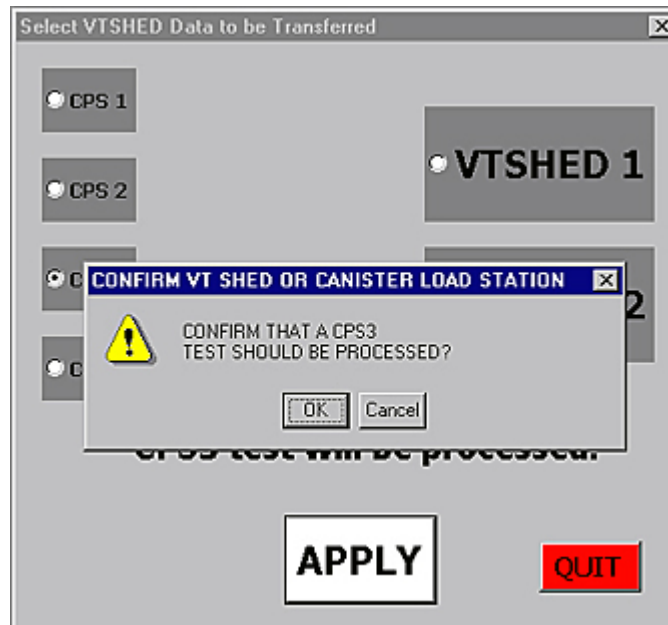


Figure 8

- 110 At this point one of two messages will appear: The message, "Canister Load Data Processing Status Message" lets you know the previously completed test identified by its number has been placed in a Workbook and post-processed. See Figure 9.

Click on the "OK" button

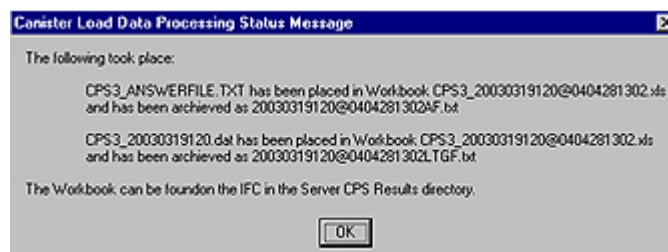


Figure 9

- 111 The second "Canister Load Data Processing Status Message" lets you know that the previously completed test has been already processed, or no pre-test file was found. See Figure 10.

Click on the "OK" button.



Figure 10

- 112 Close out the "Automatic Post Processing" dialog box by clicking in the "x" box in the upper right-hand corner. See Figure 10.
- 113 A prompt box will ask: "Do you want to save the changes you made". Click on the "No" button.
- 114 Locate the icon for "PRE-TEST PROCESSING" and double-click on it. See Figure 11.



Figure 11

- 115 Click on the "Select Test Number and Move it to Site". See Arrow in Figure 12.



Figure 12

- 116 Select the number of the CPS station used earlier to hook up the test vehicle, and click on the corresponding white button. See Figure 13.

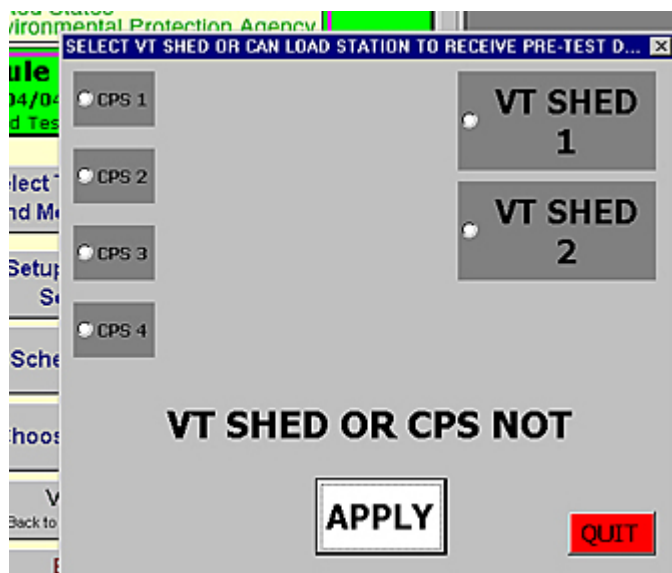


Figure 13

- 117 Click on the "Apply" button. See Figure 14.

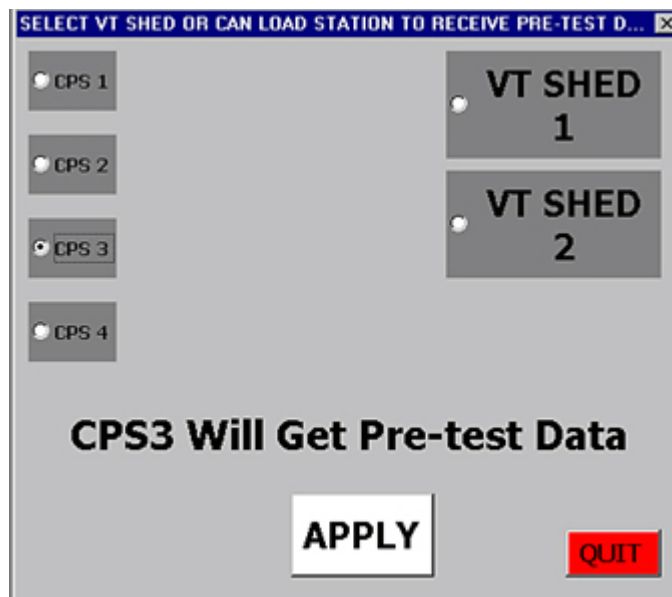


Figure 14

- 118 Click on the "OK" button on the "CONFIRM VT SHED" dialog box to verify use of the selected CPS station. See Figure 15.



Figure 15

- 119 Identify the vehicle test number from the Test Data packet supplied by Scheduling; then select the vehicle test number from the pull-down menu and highlight and single-click it. Always use the FTP number. See Figure 16.

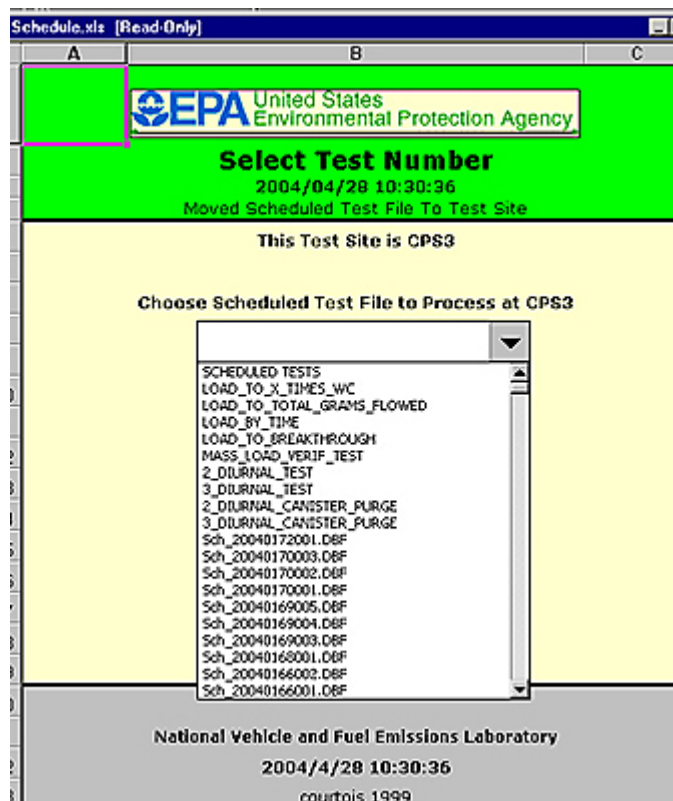


Figure 16

- 120 After the prompt appears, verify the vehicle test number and the CPS station are correct, and then click on the "OK" button. See Figure 17.

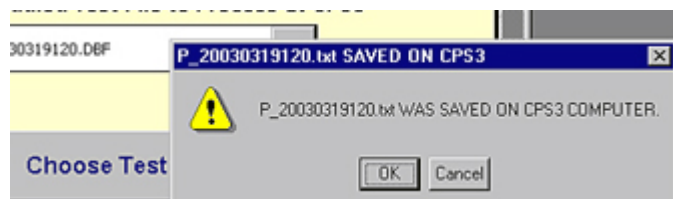


Figure 17

- 121 When the "SELECT VT SHED OR CAN LOAD STATION TO RECEIVE PRE-TEST DÖ ." dialog box appears, click on the "QUIT" button. See Figure 18.



Figure 18

- 122 Close out the "Schedule Vehicle Tests" screen by clicking on the "BACK" button.
- 123 When the next screen appears, click on "Close".
- 124 Proceed to the RISI CPS Canister Load Station.

200 Test Initiation

- 201 At the RISI CPS control unit that runs your selected station, click on the "Canister Load" button next to the CPS number you have already used to hook up the vehicle. The selected button turns green when it is activated. See Figure 19.

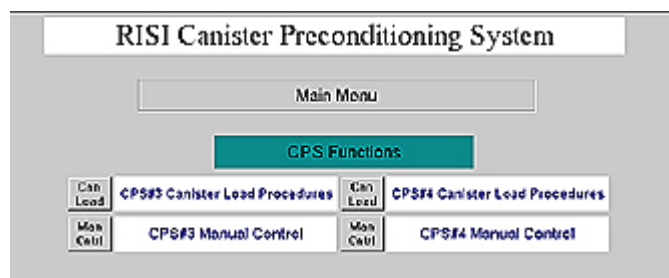


Figure 19

- 202 Click on the "Start" button beside the Diurnal Purge/Load Sequence of the loading station to be used. The "Start" button will turn green. The operator will be prompted by a message queue to fill out form information.

Note that the needed form does not always appear at the front of the screen, and may have to be located behind the existing page. See Figure 21.

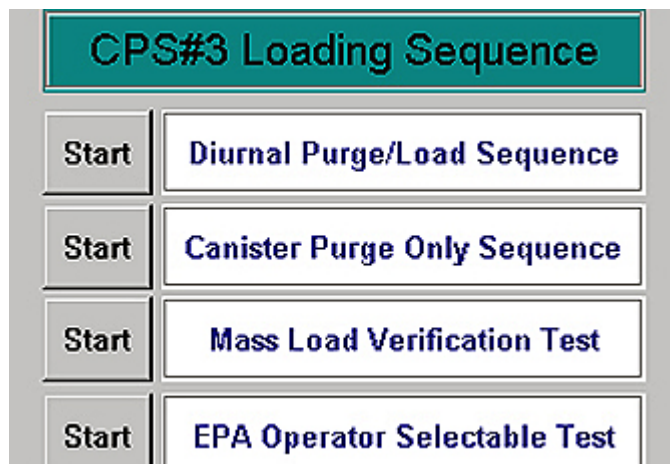


Figure 21

- 203 Do not activate "Continue" until the form is correctly filled out and saved. Proceed to the next step. See Figure 22.

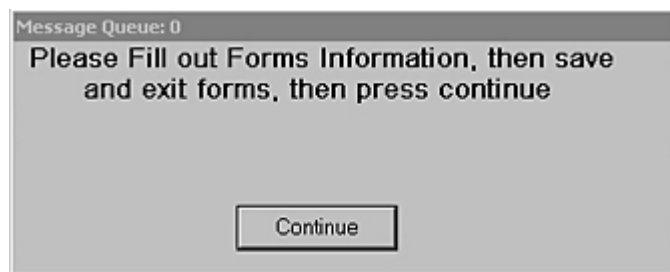


Figure 22

- 204 The majority of information needed to fill out the Form was entered at the time of "PRE-TEST PROCESSING" at the IFC computer processing station.. Complete and verify all entries. See Figure 23

The screenshot displays a software interface for canister preconditioning. The main area contains a form with the following fields:

- TestNumber_CPS3: 20040182002
- Operator_Name_CPS3: 62625
- Month_CPS3: June
- VIN_CPS3: 2B7HB11XXK504904
- Year_CPS3: 2004
- Soak_Time_Start_CPS3: 7:54
- EPA_Working_Capacity_CPS3 (grams): 174
- Requester_CPS3: PETE KOHNKEN
- TestType_CPS3: 2_DIURNAL_TEST
- Date_CPS3: 2
- VID_CPS3: H136RXX-0027
- Canister_Volume_(L)_CPS3: 1.0
- Canister_Wt_(g)_CPS3: 480.0

At the bottom, there is a navigation bar with buttons: Main Menu, Canister Precondition. System #4 Status, and Canister Precondition. System #4 Purge Status. A message queue window is open, displaying the text: "Please Fill out Forms Information, then save and exit forms, then press continue". Below the message queue is a "Continue" button. On the right side, there is a "Canister LEL Detector Status" panel with two indicators: "CPS Area LEL Status OK" (green) and "Cabinet LEL Status Alarm" (red). A status bar at the bottom left shows the time "09:07:34 AM" and the text "End of phase Answer File Write Info".

Figure 23

- 205 Verify that the proper test number was transferred.
- 206 Enter Operator's name or ID number.
- 207 Enter the present month.
- 208 The VIN number has been entered earlier by the Scheduler.
- 209 Enter the present year.
- 210 Enter the Soak Time Start, found on Form 700-01 in the test packet.

- 212 Verify that the EPA Working Capacity, found on Form 700-01, has been entered correctly by the Scheduler.
- 213 Verify that the Requester's name, found on Form 700-01, is correct.
- 214 Verify or enter the correct Test Type.
- 215 Enter the present day
- 216 Verify that the correct Vehicle ID number has been entered.
- 217 Verify that the Auxiliary Canister volume has been set at 1.0.
- 218 Verify that the Canister Weight (g) is set at 480.
- 219 Upon completion of the form, ensure the saving of the data. See Figure 24

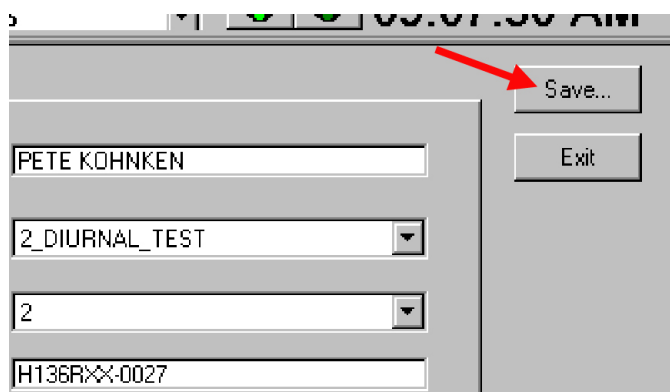


Figure 24

- 220 Once the Save button is activated, a prompt appears stating "Form Data Saved". See Figure 25. Click on the "OK" button.

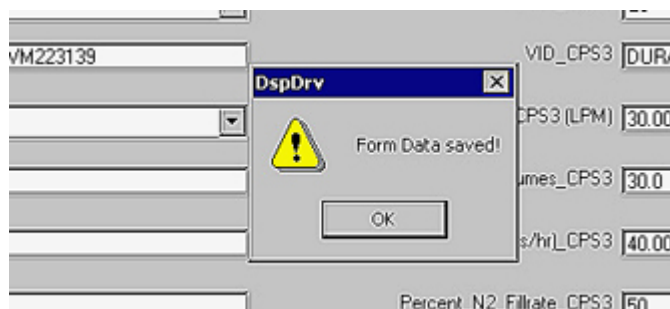


Figure 25

- 221 Click on the "Exit" button on the Header panel. See Figure 26.

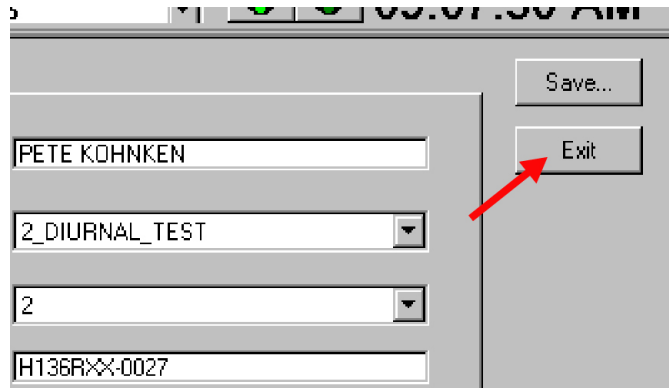


Figure 26

- 222 Click on the "Continue" button from the earlier message queue requesting the filling of forms. See Figure 27.

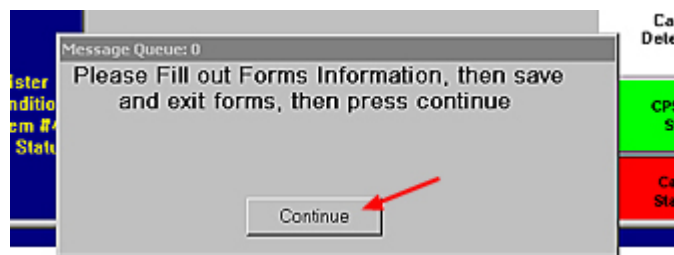


Figure 27

- 223 A prompt will appear asking the operator "Please Connect Purge Lines to Canister, then press continue". See Figure 28. Proceed to the next two steps before clicking on the "Continue CPS " button

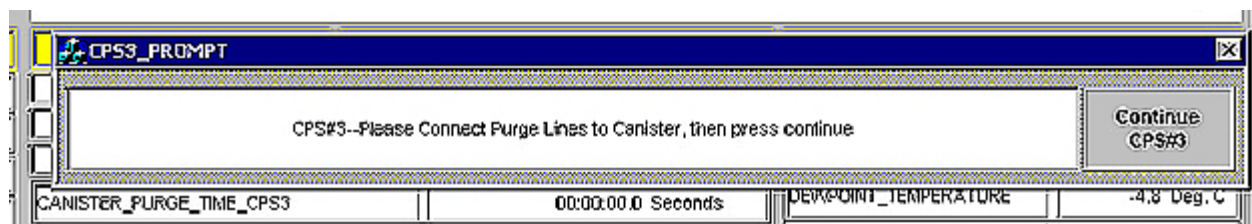


Figure 28

- 224 The canister refers to a small gray cylindrical canister known as the auxiliary canister. Auxiliary canisters are found under the safety hood beside the preconditioning system scales.

An auxiliary canister has two portals on its top. Connect the ambient air line to the center portal. See Figure 29.



Figure 29

- 225 Connect the vacuum purge line to the outside portal. See above Figure. Do not place the auxiliary canister on the scale. Leave the auxiliary canister on top of the scale's cabinet.
- 226 Upon completion of the auxiliary canister connections, click on the "Continue" button. See above Figure.
- 227 Verify on the "Data Display" screen that the purge rate is at the required level of 30.00 LPM. See Figure 30.

CPS#3 Canister Purge Data		C
CAN_PURGERATE_SPT_CPS3	30.00 LPM	
CANISTER_PURGE_RATE_CPS3	30.22 LPM	
CANISTER_PURGE_VOLUME_CPS3	300.00 Liters	
CANISTER_VOLUME_CPS3	1.00 Liters	CANISTER
PURGE TIMER CPS3	10.6	CAN_PL

Figure 30

- 228 The purge time, viewable on the Purge Display screen, takes approximately ten minutes.

The operator will be prompted by two prompts appearing simultaneously. The first prompt deals with disconnecting purge lines and placing the auxiliary canister on the scale, and connecting the Fill line. See Figure 31.



Figure 31

- 229 Do not activate either prompt until actions are completed and a prompt stating the canister purge is complete. On completion of the purge, click on the "OK" button on the second screen. See Figure 32.

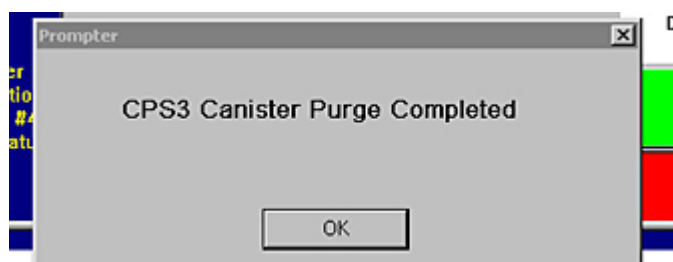
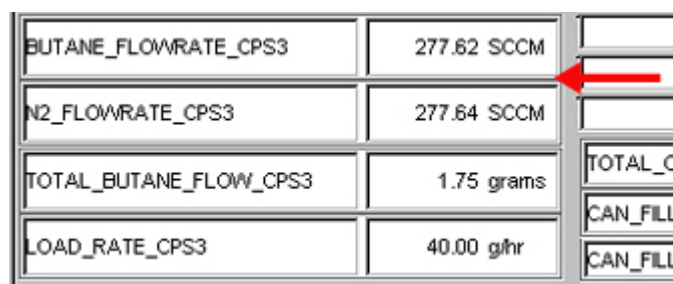


Figure 32

- 230 Disconnect the purge lines from the auxiliary canister and place the canister on the scale. Click on the "Continue" button and both prompts disappear.
- 231 Connect the piece of tubing, found inside the scale housing, to the center portal of the auxiliary canister, and place the canister on the scale.
- 232 Close the scale housing-door, and wait about 10 minutes to allow the weight of the canister to settle. Scale readings can be viewed on the Data Display Screen.

- 233 Click on the "Continue" button, located alongside the prompt of "Please Disconnect Purge Lines". In about 30 seconds the loading of the vehicle canister will begin. The canister load data can be viewed on the computer's Test Display screen.
- 234 Verify on the Test Display screen that the butane flow rate and the N₂ (nitrogen) flow rate are at the levels required for the test being performed, and that they are within $\pm 5\%$ of each other. See Figure 33.



BUTANE_FLOWRATE_CPS3	277.62 SCCM	
N2_FLOWRATE_CPS3	277.64 SCCM	
TOTAL_BUTANE_FLOW_CPS3	1.75 grams	TOTAL_C
LOAD_RATE_CPS3	40.00 g/hr	CAN_FILL

Figure 33

- 235 For the two-diurnal test, the system will load the vehicle canister to its full capacity, at which time canister breakthrough is achieved, and the excess butane/N₂ is pushed out of the vehicle canister into the auxiliary canister on the scale.

Once two grams of breakthrough gas has entered the auxiliary canister, the canister-load system will automatically stop loading and the test ends. See Figure 34.

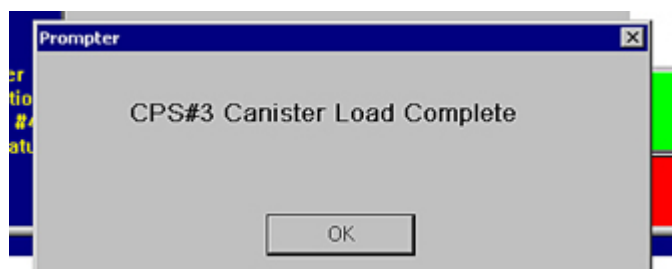


Figure 34

- 236 After the fill cycle is complete, disconnect all hoses from the vehicle canister and reconnect the vehicle canister lines to their original position.

- 237 At the end of the test, the system automatically prints a final report with the test results, Attachment D. Click on the "OK" button, see Figure 35.

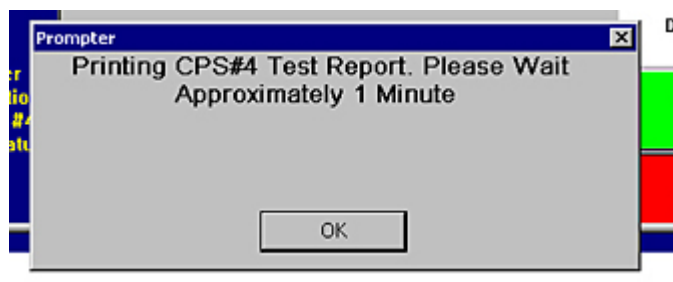


Figure 35

- 238 Click on the "OK" button, see Figure 36.

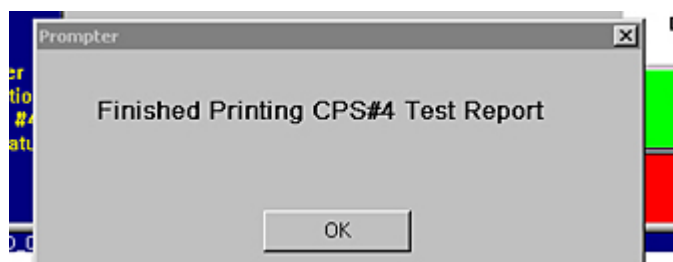


Figure 36

9. Data Input

- 9.1 The Auxiliary Canister ID Number and, if needed, the Certification signature (for > 15 g/h butane load rate) are recorded on the appropriate forms.
- 9.2 The following data is entered in the "Canister.vi" program:
- Test Mode
 - Test Type
 - Test Number
 - Vehicle Number
 - Operator ID
 - Baro (inHg)
 - Canister Vol (L)
 - Canister Cap (g)

9.3 The following information is automatically recorded by the "Canister.vi" program:

CPS Station ID

Date

Canister Purge Cycle Start Time

Canister Purge Cycle Stop Time

Canister Purge Cycle Time

Total Air or Butane Flow

Total Nitrogen Flow

Combined Total flowed

Canister Load Cycle Start Time

Canister Load Cycle Stop Time

Canister Load Cycle Time

10. Data Analysis

The technician who performs the procedure is required to perform Steps 10.1 through 10.3.6 and the technician validating the data is required to perform all the steps in Section 10.

10.1 Verify the following on the "Canister Preconditioning System Test Report":

10.1.1 Verify that the canister volume and the canister capacity were accurately transcribed from the "Vehicle Information Data Sheet" or manufacturer-supplied instructions.

10.1.2 All manual entries were entered correctly.

10.1.3 The "Started" time, under the "Purge" column, is after the "End of Fill" time on Form 702-01.

10.1.4 The "Ended" time, under the "Load" column, is within 36 hours of the "VDA Summary Report Preconditioning Finished" time.

10.1.5 For the two-diurnal, the weight gain on the auxiliary canister was greater than 2 grams and less than 3 grams.

10.1.6 For the two-diurnal, the word "Weight" appears in the "Purge" and "Load" columns next to "Finish." For the three-diurnal, the word "Volume" appears in the "Purge" and "Load" columns next to "Finish."

- 10.1.7 The word "NO" appears in the "Purge" and "Load" columns next to "Fault."
- 10.1.8 The technician entered their "Technician ID" number and the current "Date."
- 10.2 Review Form 700-04 (or Form 700-05) to ensure that it has been completely filled out.

11. Data Output

- 11.1 Form 700-04 (or Form 700-05) is placed in the test packet.
- 11.2 The "Canister Preconditioning System Test Report" is filed in the test packet.
- 11.3 An electronic Excel ^{AE} test file is stored on the computer hard drive.
- 11.4 A copy of all manufacturer-supplied instructions is placed in the test packet.

12. Acceptance Criteria

- 12.1 The purge and load ambient temperatures must be within 20-30 °C.
- 12.2 The start and end times of the canister preconditioning sequence must be performed within the vehicle soak period. The soak period starts at the completion of the vehicle fueling following the preconditioning drive cycle and ends 12-36 hours later.
- 12.3 The butane total flow must be within ± 5 percent of the nitrogen total flow.
- 12.4 For the two-diurnal, The canister is loaded with a mixture composed of 50 percent butane and 50 percent nitrogen by volume at a rate of 40 grams/hour.
- 12.5 For the two-diurnal, the auxiliary canister must gain 2.0 grams to 3.0 grams.
- 12.6 For the three-diurnal, the specific humidity must be 50 ± 25 gr/lb.
- 12.7 For the three-diurnal the butane total flow must be at least 1.5 times the canister capacity.
- 12.8 For the three-diurnal, the canister is loaded with a mixture composed of 50 percent butane and 50 percent nitrogen by volume at a rate of 15 ± 2 grams/hour unless the Certification Division has authorized an accelerated rate in order to perform the canister loading in 12 hours.

13. Quality Provisions

- 13.1 The "Canister.vi" program automatically controls the canister loading with a mixture composed of 50 percent butane and 50 percent nitrogen at a rate of 40 grams/hour for the two-diurnal or 15 grams/hour for the three-diurnal (unless authorized to load at faster rate).
- 13.2 Completion of Form 700-04 (or Form 700-05) indicates that the procedure has been followed and that all requirements of the procedure have been met.
- 13.3 System verifications are performed three times a year to ensure that the total weight gain of a designated canister is repeatable within ± 5 percent of a 40-gram load in 1 hour. Control charts are used to track the results.
- 13.4 Verifications are performed three times a year on the Sartorius scale by, one at a time, placing a 500-gram, a 1000-gram, and a 2000-gram weight on it. When the 500-gram weight is on the scale, the system will be tared and a 2-gram weight added to ensure proper system operation. All weights are traceable to the National Institute of Standards and Technology (NIST).
- 13.5 Yearly calibrations, or other calibrations necessitated by system malfunction, are performed on the mass flow controllers. The calibration is performed using the Sierra calibration bench, which is traceable to NIST standards.
- 13.6 Deviations from this procedure are documented on Form 902-01. In general, these deviations will void the data. However, the customer may choose to accept the data as variant. To do this, the customer must indicate acceptance by signing and dating Form 902-01.

Attachment A

Canister Preconditioning System Diagram

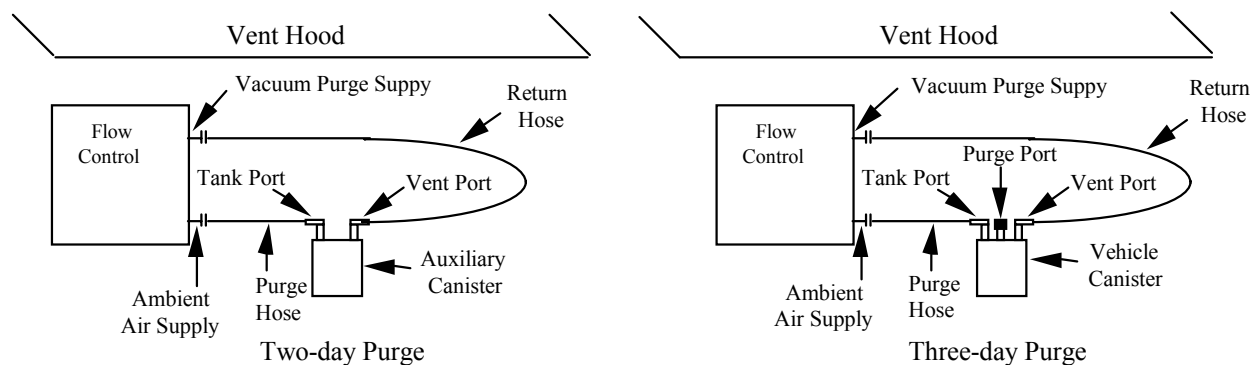
Two-diurnal and Three-diurnal
Purge Connections

Figure 1

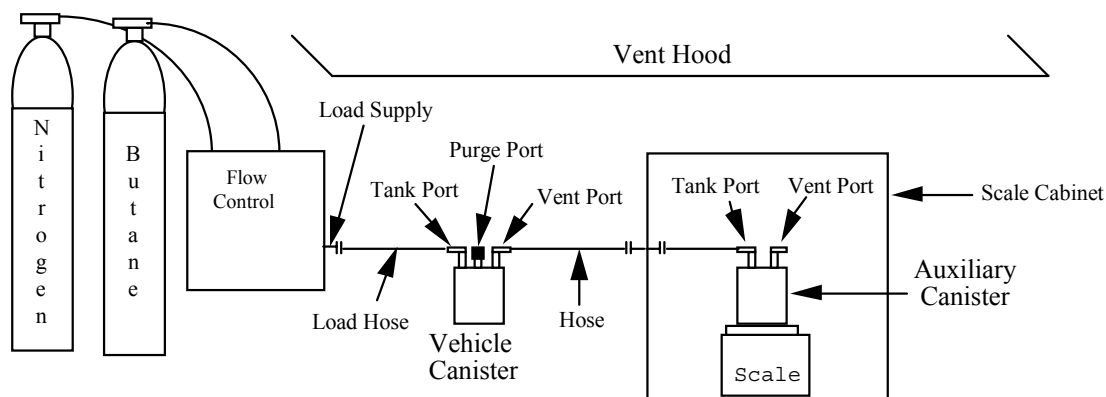


Figure 2

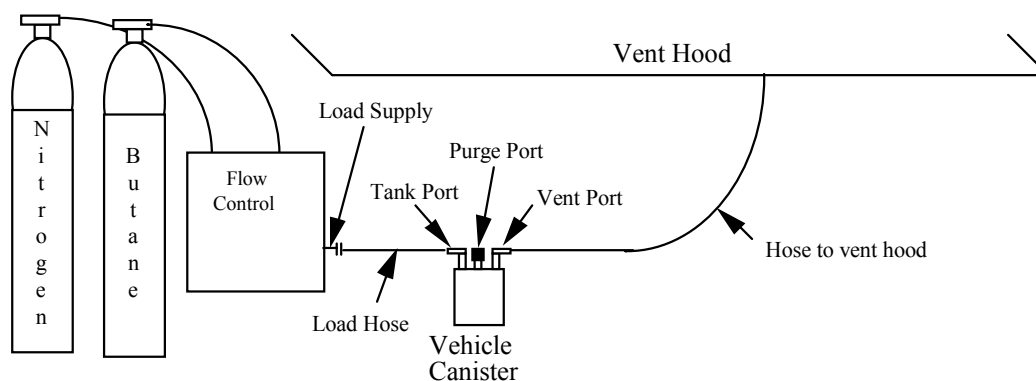


Figure 3

Note: The canister is not removed from the vehicle unless access is limited. Also, you may need to use the purge port instead of the vent port for some vehicle canisters.

Attachment B
Canister Load with Enhanced Evap

Vehicle ID # _____

Test Number _____

Canister Capacity: _____**Number of Canisters:** _____Canister Preconditioning Type: Two-diurnal _____ Three-diurnal _____

_____ CPS hoses connected to ports and vents per manufacturer instructions

_____ Auxiliary Canister ID # _____ (two-diurnal only)

_____ Two-day diurnal verify load rate 40 ± 2 grams/hour_____ Three-day diurnal load rate $> 15 \pm 2$ grams/hour
If yes, approved by a Certification Representative

_____ Certification Representative Signature

I performed all steps in accordance with the requirements of Test Procedure 700.

Technician: _____ Date _____

1 **Start 6-36-hr soak. Record hot soak "end" date/time**

Date	Time	Initial
	+6:00	

Add 6 hours to the time recorded above.

2 **Do not start 2 Day (3-Day) Diurnal before**

Date	Time
	+30:00

Add 30 hours to the time recorded above (to get 36 hour max time)

3 **2 Day (3-Day) Diurnal must be started before**

Date	Time

Span gas cylinders > 500 psi. If < 500 psi, don't start test.Temperature set-point at 22.22°C

Chiller and Heater tank water level OK

Volume Control, Temperature Control, Vent Fan buttons turned on

Header and Test Control screens completed.

Enter pretest Test number on NT computer

Test type selected in "TEST CYCLE."

Three-minute SHED Purge Completed

4 **Record 2 Day (3-Day) Diurnal "Start" date/time**

Date	Time	Initial

I have initialed the steps I performed to indicate that I performed all steps in accordance with the requirements of Test Procedure 700.

Technician ID#: _____ Date: _____

Attachment C
Canister Preconditioning Only
No Enhanced Evap

Vehicle ID # _____

Test Number _____

Canister Capacity:**Number of Canisters:****Yes**

_____ CPS hoses connected to ports and vents per manufacturer instructions

_____ N/A Auxiliary Canister ID # _____ (two-diurnal only)

_____ N/A Two-day diurnal load rate 40 ± 2 grams/hour_____ N/A Three-day load rate $> 15 \pm 2$ grams/hour

If yes, approved by a Certification Representative

_____ Certification Representative Signature

I have performed all steps in accordance with the requirements of Test Procedure 700.

Technician's ID _____

Date _____

Attachment D

**Environmental Protection Agency Canister Preconditioning System #1
2-Day / 3-Day Diurnal Purge and Load Test Report**

Test Number		
Test Type	3_DIURNAL_TEST	
Operator	17465	
Requester	000000	
VID	CANISTER LOAD CPS1	
Vehicle Soak Time Start	07:17	
Month	February	
Date	10	
Year	2004	

Diurnal Purge Test Data

Canister Purge Volume	30.17	Liters
Canister Purge Cycle Status	YES	
Canister Purge Cycle Start Time		14:50:22.1
Canister Purge Cycle Stop Time		14:51:39.0
Canister Purge Cycle Time		00:01:17.0

Diurnal Load Test Data

Canister Volume	0.10	Liters
Canister Working Capacity	1.00	grams
Canister Weight Gain	512.90	grams
Total Butane Flowed in scc	621.34	scc
Total Nitrogen Flowed in scc	613.58	scc
Combined Total Flowed in scc	1234.92	scc
Canister Load Cycle Status	YES	
Canister Load Cycle Start Time		14:53:30.5
Canister Load Cycle Stop Time		14:59:28.7
Canister Load Cycle Time		00:05:58.2

Test Validation Data

Load Rate Validation Check	PASS	
Butane/N2 Total Flow Validation Check	PASS	
Ambient Temperature Validation Check	PASS	
Total Amount of Butane Validation Check	PASS	
Specific Humidity Validation Check	FAIL	
Aux Canister Weight Gain Validation Check	N/A	
Purge Cycle Validation Check	FAIL	
Overall Diurnal Load Cycle Validation Check	FAIL	

Notes:

have performed all steps in accordance with the requirements of Test Procedure 720.

Technician ID#: _____ Date: _____

The data entries are correct and meet the requirements of Test Procedure 720.

Verified By: _____ Date: _____